REMARKS

The claims appearing in this patent application following amendment are now Claims 11-17, inclusive. Each of original Claims 1-10 has been cancelled, without prejudice. Claims 12-17 are recited for the first time. Claim 11 has been amended.

Claims 1-8 and 10 are rejected under 35 U.S.C. 103 as being unpatentable over the patents to Pieroni et al (5,922,944) in view of the patents to Scott (4,155,249) and Gouge (5,859,363). Claim 9 is rejected under 35 U.S.C. 103 as being unpatentable over the aforementioned patent to Pieroni et al in view of aforementioned patents to Scott and Gouge in further view of the patent to Brayman et al. The Examiner maintains that Claim 11 is substantially equivalent to original Claim 9 and, apparently, also stands rejected. Each of original Claims 1-10 has been cancelled, without prejudice and, therefore, the rejections thereof are rendered moot.

Independent Claim 11 has been amended to recite a method for detecting leaks in a fluid system (e.g. the evaporative system of a motor vehicle) to be tested in a volatile potentially explosive environment including the steps of locating a heating element in a sealed chamber, creating a mixture of oil and fluorescent dye, blowing some of said mixture of oil and fluorescent dye against the heating element within the sealed chamber by means of a non-combustible nitrogen gas to prevent dieseling within said sealed chamber and the possibility of an explosion at the volatile potentially explosive environment in which the fluid system is to be tested, vaporizing the blown mixture into smoke so that the fluorescent dye will be carried to the fluid

system under test, whereby the smoke carrier will exit a leak in the fluid system, and shining ultraviolet light on the fluid system under test to illuminate the trace left by the fluorescent dye around the leak.

The patent to Scott referred to by the Examiner in the Office Action relates to an aerosol-type container tank having a liquid to be vaporized or atomized in order to produce a cold fog. A color may be added to the liquid being vaporized to produce a color residue. However, the atomized liquid to which the color is added will quickly condense which requires that a continuous supply of fog be fed through the system under test. Consequently, the teachings of Scott are only applicable to finding relatively large leaks in relatively large, open systems, such as vented sewers, so that a supply of fog can be continuously added and purged from the system. In other words, the technique of Scott cannot be used to find very small leaks such as those which may arise in a closed fluid system (e.g. the fuel vapor recovery system or an air brake system of a motor vehicle system). The atomized fog of Scott would almost instantly condense if it were introduced into a closed fluid system such that no fog would be present at the site of a very small leak (e.g. .005 inches) and, therefore, no color would be deposited around the leak. Consequently, the vaporized fog of Scott is not at all applicable to finding very small leaks in a closed fluid system of the type through which a working gas or liquid is to be transported under pressure.

As opposed to the atomizing procedure taught by Scott, the applicants' method requires that a dye first be bonded to a smoke producing solution (i.e. oil) and then resist destruction as the mixture is heated and vaporized by a heating element. In addition, the smoke carrying dye

must be capable of being transported for long distances so as to be introduced to the system under test. Unlike the cold fog used by Scott, the applicants' smoke and dye marker combination will not immediately condense but will remain suspended for as long as 15 to 20 minutes in order to allow the smoke to reach a leak at the system under test and leave a deposit of dye at the exit (i.e. leakage) point.

Inasmuch as atomizing (as taught by Scott) is opposite of the applicants' method of vaporization and inasmuch as the method taught by Scott is not at all applicable to locating small leaks in a closed fluid system (as is otherwise accomplished by the applicants and specifically recited in new Claim 17), there is absolutely nothing to record herein to suggest that one skilled in the art would use or combine the teachings of Scott with Pieroni et al when it is recognized that Scott and Pieroni et al are based upon entirely different technologies for use within entirely different environments.

What is even more, Pieroni et al (i.e. the applicants prior patent) describes the use of compressed air (which contains combustible oxygen) to blow oil against a heating element, because it was believed that a combustible gas would promote the ignition process necessary for vaporizing the oil into smoke. That is to say, one would expect the compressed air to burn so as to create a combustible environment in which to make smoke. In this same regard, where compressed air is used in a volatile, potentially explosive environment (such as near the vapor recovery system of a motor vehicle), any increase in temperature and/or pressure in the presence of a spark could ignite the entire system at which the smoke and dye marker combination is to be used.

To overcome the risk of an explosion at the volatile, potentially explosive environment, the applicants' method includes the use of a non-combustible gas, namely nitrogen, to blow the mixture of flammable oil and fluorescent dye against a heating element that is located within a sealed chamber. It is pointed out that nitrogen gas is inert, contains no oxygen and, therefore, is non-combustible. One of ordinary skill would not be inclined to use a gas that will not burn to promote an ignition process to vaporize the oil and dye mixture into smoke. Contrary to what would be expected by using a non-combustible gas, the applicants' use of nitrogen gas to blow the flammable oil and dye mixture against the heating element within the sealed chamber permits smoke to be generated as a carrier for the dye at higher pressures and temperatures and without the risk of an explosion.

This unexpected discovery of using non-combustible nitrogen gas in an ignition process to burn flammable oil and thereby generate smoke as a carrier for the fluorescent dye is an essential feature of the applicants' method. To this end, it is recited in the applicants' specification at page 5, lines 7-10:

> In the alternative, the air inlet tube may be coupled to a source of non-flammable gas, such as nitrogen, or the like, so that a relatively safe, non-explosive environment can be established, especially for use in volatile situations, such as in systems which transport a flammable liquid (e.g. a fuel tank, or the like).

Furthermore, the method claimed by the applicants does not use nitrogen gas as a trace gas or as a carrier for a trace gas. The nitrogen gas claimed by the applicants is used specifically for the purpose of blowing a mixture of flammable oil and fluorescent dye toward a heating element that is located in a sealed chamber in a volatile, potentially explosive environment. The smoke that is produced when the mixture is vaporized within the sealed chamber functions as the carrier of the fluorescent dye marker. In the patent to Brayman et al, also referred to by the Examiner in the Office Action, there is a suggestion to use nitrogen as a carrier of a halogen gas to detect a leak in the relatively safe environment of automotive wheel rims. However, the method claimed by the applicants in independent Claim 11, as now amended, makes no reference to the use of non-combustible nitrogen gas as a trace or a carrier, but only as an unexpected, safe means for blowing a mixture of flammable oil and fluorescent dye against a heating element within a sealed chamber to promote ignition and thereby cause the oil to burn while avoiding dieseling within the sealed chamber and the possibility of an explosion.

Thus, despite the use of nitrogen gas as a carrier for a trace gas as taught by Brayman et al, there is absolutely nothing shown or suggested in any of the patents to Pieroni et al, Scott, Gouge and Brayman et al, or any reasonable combination thereof, which would teach the improbable use of non-combustible nitrogen gas (i.e. a gas that does not burn) to blow a mixture of flammable oil and fluorescent dye against a heating element within a sealed chamber to promote the vaporization of such oil into smoke to be delivered to a fluid system under test at a volatile potentially explosive environment. In this same regard, the teachings of Brayman et al relate to checking the integrity of automotive wheel rims at a relatively safe, non-volatile environment. There is simply no reason why one of ordinary skill would think or be motivated to

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apply the nitrogen carrier of Brayman et al to the applicants' sealed smoke producing chamber wherein a mixture of flammable oil and fluorescent dye is blown against a heating element to cause an ignition process by which to produce smoke for use at a volatile, potentially explosive environment so that dieseling within the sealed chamber will be avoided and the possibility of an explosion eliminated.

Accordingly, independent Claim 11, as now amended, is believed to recite a method for generating a smoke carrier for a fluorescent dye to be delivered to a system under test at a volatile, potentially explosive environment which is distinguishable from all of the art which is currently of record herein. Inasmuch as independent Claim 11 is believed to be patentable, Claims 12-17, which depend therefrom, are likewise believed to be patentable.

As evidence of the patentability of the applicants' method, a video tape has been presented to the Examiner to demonstrate the unexpected results of using non-combustible nitrogen gas to cause flammable oil to burn to generate smoke while eliminating a dieseling effect within a sealed chamber. As yet additional evidence of the patentability of the applicants' method, attached hereto is an article from the September, 2001 edition "Motor" Magazine, wherein the "Top 20 Tools Awards" for 2001 are listed. Featured at page 36 as one of the "Best of the Best" is the Leak Master Evap System Tester by Champion Engineering (the applicants' employer). Described therein is the applicants' claimed apparatus/method for administering a nitrogen-delivered diagnostic smoke test to detect evaporative emissions leaks. In particular, it is stated within this article that:

> The next step in the process is the nitrogen-delivered diagnostic smoke test, where typically you'll see smoke emanating from the leak point. With really small leaks (or several small ones) you get a second a chance to pinpoint the leak because of a trace dye, which is added to the smoke, leaves residue at the leak. You can be sure of the exact location by simply aiming your ultraviolet light there. Things don't get much simpler, guys!

Thus, the applicants' claimed method has been recognized by the trade as one of the best innovative new products/methods for 2001.

In view of the foregoing, each of Claims 11-17 which appears in this patent application is believed to recite a patentable method. In this same regard, the applicants submit that the aforementioned amendment to independent Claim 11 places this pending application in condition for allowance. However, the total number of claims remaining in this application has been reduced and the method recited by the applicants has not been changed. It is only the editorial content of independent Claim 11 that is affected so as to better define the scope of the applicants' method and thereby more clearly recite the environment in which the applicants' method has particular application. Thus, entry of this Amendment After Final Rejection is requested.

Accordingly, reconsideration of the Examiner's final rejection is requested and a Notice of Allowance is earnestly solicited.

A Request for a One Month Extension of Time is also enclosed, whereby to extend the deadline for responding to the outstanding Office Action until October 25, 2001.

Respectfully submitted,

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October 25, 2001

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Dated

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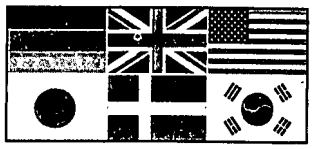

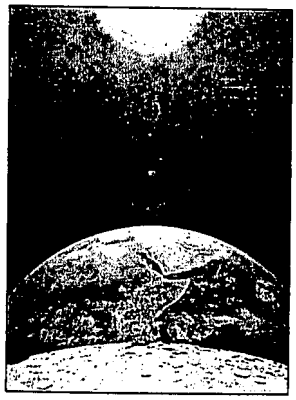

On The Cover

THE BEST OF THE BEST

Here's our report on the winners of MOTOR's 2001 Top 20 Tools Awards competition—this year's most innovative new products.

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TECHNICAL

REPORTS

DEPARTMENTS

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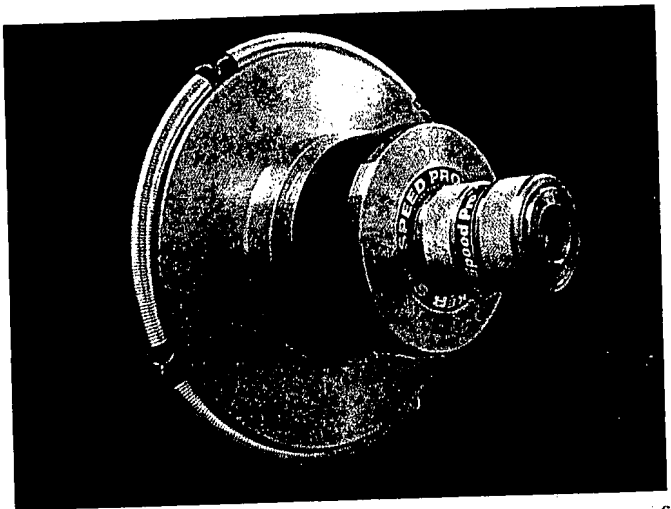
routine jobs, you can reach through any front-end opening and spray the front of the condenser. As for a backflush, just loosen up the shrouding, move it back, stick the wand in, turn on the water and within minutes you've got a professionally done cleaning job. What a country!

Speed Pro Brake Lathe Arbor Nut System by Sun Tool Company

It's funny how some of our sturdiest shop equipment can be the most fragile. Take a common brake lathe, for example. Overtighten the hex-shaped arbor nut with a wrench just a tad on a rotor or drum with an uneven hat section and chances are real good you'll bend the arbor. Not only will that set you back a couple of hundred clams for repairs, but the lost revenue from the down time is immeasurable. Of course, that's assuming you'll even *notice* the wobble; not very likely, since a bent arbor is basically impossible to visually detect. About the only thing you *will* notice are the comebacks that result from the pulsation complaints you'll get because the arbor isn't running true. We're not painting a very pretty picture, are we?

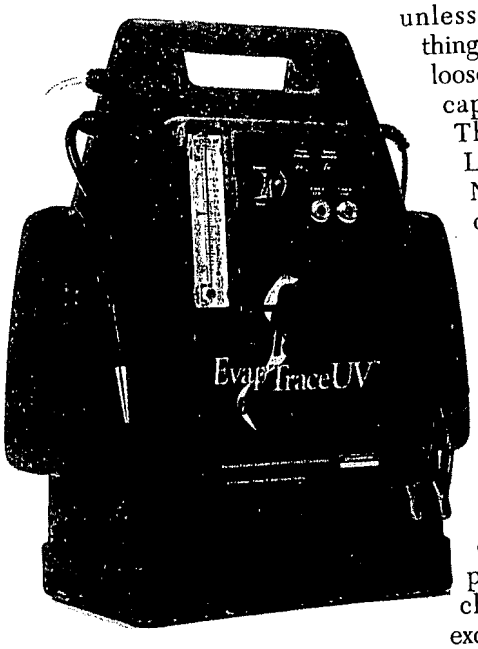
Fortunately, there is a solution—the patent pending Speed Pro Brake Lathe Arbor Nut System from the folks at Sun Tool. In a nutshell, Speed Pro is two tools in one—a self-aligning spacer and a round, knurled arbor nut that's spun on by hand. Just put, say, your rotor on the lathe, install the spacer, then snug everything down with a few spins of the nut. The setup automatically aligns the arbor



to the work piece, provides just the right amount of torque, allows dead-on machining and reduces the risk of injury should your hand make contact with the spinning nut. Impressed? So were we!

LeakMaster EVAP System Tester by Champion Engineering

When evaporative emissions leak detection became part of the diagnostic capability of OBD II, techs were finally able to determine if a fuel vapor leak existed in the system. *Finding* the actual leak point remained difficult, however,



unless it were something very obvious—a loose or missing gas cap, for example. The Champion LeakMaster NE240 is a state-of-the-art smoke machine with a choice of tests, all of which are designed to make finding EVAP leaks a piece of cake.

The NE240's "triple-choice operation" starts out with a basic pressure/flow rate check. If leakage exceeds the rate calibrated into the machine (.020 inch, .040 inch), that confirms that there is a leak, and its apparent size, as well. By the way, the machine can be calibrated to identify leaks smaller than .020 inch, which will be especially useful if the standards are tightened.

The next step in the process is the nitrogen-delivered diagnostic smoke test, where typically you'll see smoke emanating from the leak point. With really small leaks (or several small ones) you get a second chance to pinpoint the leak because a trace dye, which is added to the smoke, leaves a residue at the leak. You can be sure of the exact location by simply aiming your ultraviolet light there. Things don't get much simpler, guys!

Although the NE240 is designed primarily for EVAP system testing, it also can be used as a general-purpose smoke machine (water, wind, vacuum and exhaust leaks, as examples).

What Quits First? by Lenehan Research

Intermittent stalls and "hiccups" still are the diagnostic challenges of this industry. The "flight recorders" that use scan data from the serial data line sometimes help, but the refresh rates still are too slow. DSOs (digital storage oscilloscopes) will pick up most of the problems, but not every shop has one.

What most techs really want to know is where to look first, and that comes down to either the ignition or fuel system. It would be nice to get a precise answer, but a good starting point is what stopped first, the "fire" at the plugs or the spritz from the injectors?

What Quits First? is an appropriately named diagnostic tool. It's designed to analyze the last fraction of a second of engine operation prior to a die-out, then helps you make a quick determination of what circuit is responsible. The box itself is made of high-quality, drop-resistant plastic and has